AMENDMENTS TO THE CLAIMS

This listing of the claims will replace all prior versions and listings of the claims in this application.

Listing of the Claims:

1. (Currently amended) A method for performing an electromigration check for conductors with alternating current flow adjacent to conductors with direct current flow in an integrated circuit comprising:

determining resistances R_{WIRE} and a capacitance matrix $\mathbf{C}$ for the integrated circuit;

converting the capacitance matrix $\mathbf{C}$ into a thermal conductance matrix $\mathbf{G}$;

determining temperature differences $\Delta\mathbf{T}_{ni}$ between conductors from thermal conductances G_{thi} of the thermal conductance matrix $\mathbf{G}$;

approximating power flow $\mathbf{P}_n$ into conductors with direct current flow due to adjacent conductors with alternating current flow in the integrated circuit from the temperature differences $\Delta\mathbf{T}_{ni}$ between conductors and the thermal conductances G_{thi};

determining a power limit as a function of the maximum temperature difference ΔT_{MAX} that ensures reliability of the integrated circuit; ~~and~~

performing the electromigration check by limiting power generated in the conductors with alternating current flow to less than the power limit;

wherein n and i are conductor numbers; and

wherein n, ni and thi are numerical subscripts that identify parameters as associated with conductor n, conductor n and conductor i, and a thermal characteristic of conductor i, respectively.

2. (Original) The method of claim 1, wherein the thermal conductance matrix **G** is determined from the product of the capacitance matrix **C** and a scalar factor F and the scalar factor is given by a ratio of thermal conductivity κ to permittivity ε.

3. (Original) The method of claim 1, wherein the power limit is given by the product of scalar factor F, the total capacitance C_{ntot} and the maximum temperature difference $\Delta\text{-}\mathbf{T}_{MAX}$.

4. (Original) The method of claim 1, wherein the I_{RMS} value is determined by the expression:

$C_{load}*V_{dd}*\text{frequency}*\text{Switching factor}$.

5. (Original) The method of claim 1, wherein the thermal conductances $\mathbf{G}_{thi}$ are inputs for a circuit simulator that determines temperature differences between conductors $\Delta\mathbf{T}_{ni}$ as outputs of the circuit simulator.

6. (Currently amended) The method of claim 1, wherein the capacitance matrix **C** and resistances R_{WIRE} are determined by using simulation and analysis tools that ~~at least~~ include capacitance/resistance extraction capabilities.

7. (Currently amended) A method for performing an electromigration check for conductors with alternating current flow adjacent to conductors with direct current flow comprising:

determining resistances R_{WIRE} and capacitances C_{ni} for conductors with alternating current flow and conductors with direct current flow;

converting the capacitances C_{ni} into thermal conductances $\mathbf{G}_{thi}$;

determining temperature differences $\Delta \mathbf{T}_{ni}$ between conductors from the thermal conductances $\mathbf{G}_{thi}$;

approximating power flow $\mathbf{P}_n$ into conductors with direct current flow due to adjacent conductors with alternating current flow from the temperature differences $\Delta \mathbf{T}_{ni}$ between conductors and thermal conductances $\mathbf{G}_{thi}$;

determining a power limit as a function of a maximum temperature difference ΔT_{MAX} for the conductors that ensures reliability of the ~~conductor~~ conductors; ~~and~~

performing the electromigration check by limiting power generated in the conductors with alternating current flow to less than the power limit;

wherein n and i are conductor numbers; and

wherein n, ni and thi are numerical subscripts that identify parameters as associated with conductor n, conductor n and conductor i, and a thermal characteristic of conductor i, respectively.

8. (Currently amended) The method of claim 7, wherein the thermal conductances - $\mathbf{G}_{thi}$ are determined from the product of the capacitances C_{ni} and a ~~factor F and scalar~~ factor F is given by a ratio of thermal conductivity κ to permittivity ε.

9. (Original) The method of claim 7, wherein the power limit is given by the product of scalar factor F, the total capacitance C_{ntot} and the maximum temperature difference Δ-$\mathbf{T}_{MAX}$.

10. (Original) The method of claim 7, wherein the I_{RMS} value is determined by the expression:

C_{load}*V_{dd}*frequency*Switching factor.

11. (Original) The method of claim 7, wherein the thermal conductances $\mathbf{G}_{thi}$ are inputs for a circuit simulator that determines temperature differences between conductors $\Delta\mathbf{T}_{ni}$ as outputs of the circuit simulator.

12. (Original) The method of claim 7, wherein the capacitances C_{ni} and resistances R_{WIRE} are determined by using simulation and analysis tools that at least include capacitance/resistance extraction capabilities.

13. (Currently amended) A method for performing a check of local heating in a device comprising:

determining resistances R_{WIRE} and at least one of capacitances C_{ni} and a capacitance matrix **C** for the device;

determining thermal conductances $\mathbf{G}_{thi}$ from the at least one of capacitances C_{ni} and a capacitance matrix **C**;

setting a maximum temperature difference ΔT_{MAX} in accordance with electromigration requirements; determining a power limit F $*C_{ntot}*\Delta\mathbf{T}_{MAX}$ as a function of the maximum temperature difference $\Delta\mathbf{T}_{MAX}$;

checking ~~each~~ interconnect ~~conductor~~ conductors with ~~an~~ alternating current flow to determine if power generated $I_{RMS}*R_{WIRE}^2$ is less than the power limit F $*C_{ntot}*\Delta\mathbf{T}_{MAX}$;

indicating no local heating problem with an interconnect conductor when power generated $I_{RMS}*R_{WIRE}^2$ is less than the power limit F $*C_{ntot}*\Delta\mathbf{T}_{MAX}$;

indicating a local heating problem exist with ~~current~~ said interconnect conductor when the power generated $I_{RMS}*R_{WIRE}^2$ is equal to or greater than power limit F $*C_{ntot}*\Delta\mathbf{T}_{MAX}$ and taking corrective action to reduce the power generated $I_{RMS}*R_{WIRE}^2$; and

continuing to check ~~each~~ interconnect ~~conductor~~ conductors with alternating current flow until all interconnect conductors have a value for power generated $I_{RMS}*R_{WIRE}^2$ less than the power limit F $*C_{ntot}*\Delta\mathbf{T}_{MAX}$ ~~.~~ ;

wherein n and i are conductor numbers, F is a scalar factor and C_{ntot} is a total capacitance; and

wherein n, ni and thi are numerical subscripts that identify parameters as associated with conductor n, conductor n and conductor i, and a thermal characteristic of conductor i, respectively, F is a scalar factor, and ntot is a numerical subscript identifying a total value of an associated parameter.

14. (Currently amended) The method of claim 13, wherein the thermal conductances $\mathbf{G}_{thi}$ are determined from the product of the capacitances C_{ni} and ~~a factor F and~~ scalar factor F is given by a ratio of thermal conductivity κ to permittivity ε.

15. (Currently amended) The method of claim 13, wherein the power limit is given by ~~the~~ a product of scalar factor F, the total capacitance C_{ntot} and the maximum temperature difference $\Delta\mathbf{T}_{MAX}$.

16. (Original) The method of claim 13, wherein the I_{RMS} value is determined by the expression:

C_{load}*V_{dd}*frequency*Switching factor.

17. (Currently amended) The method of claim 13, wherein said thermal conductances $\mathbf{G}_{thi}$ are inputs for a circuit simulator that determines temperature differences $\Delta\mathbf{T}_{ni}$ as outputs of the circuit simulator.

18. (Currently amended) The method of claim 13, wherein the capacitances C_{ni} and resistances R_{WIRE} are determined by using simulation and analysis tools that ~~at least~~ include capacitance/resistance extraction capabilities.

19. (Currently amended) A computer-readable medium having a plurality of computer executable instructions for causing a computer to perform an electromigration check for conductors with alternating current flow adjacent to conductors with direct current flow in an integrated circuit, the computer executable instructions comprising:

instructions for determining resistances R_{WIRE} and a capacitance matrix **C** for the integrated circuit;

instructions for converting the capacitance matrix **C** into a thermal conductance matrix - **G**;

instructions for determining temperature differences $\Delta \mathbf{T}_{ni}$ between conductors from thermal conductances G_{thi} of the thermal conductance matrix **G**;

instructions for approximating power flow $\mathbf{P}_n$ into conductors with direct current flow due to adjacent conductors with alternating current flow in the integrated circuit from the temperature differences $\Delta \mathbf{T}_{ni}$ between conductors and the thermal conductances G_{thi};

instructions for determining a power limit as a function of the maximum temperature difference ΔT_{MAX} that ensures reliability of the integrated circuit; ~~and perform~~

instructions for performing the electromigration check by limiting power generated in the conductors with alternating current flow to less than the power limit,

wherein n and i are conductor numbers; and

wherein n, ni and thi are numerical subscripts that identify parameters as associated with conductor n, conductor n and conductor i, and a thermal characteristic of conductor i, respectively, F is a scalar factor, and ntot is a numerical subscript identifying a total value of an associated parameter.

20. (Currently amended) The ~~method~~ computer readable medium of claim 19, wherein the thermal conductance matrix **G** is determined from the product of the capacitance matrix **C** and a scalar factor F and the scalar factor is given by a ratio of thermal conductivity κ to permittivity ε.

21. (Currently amended) The ~~method~~ computer readable medium of claim ~~1~~ 19, wherein the power limit is given by the product of scalar factor F, the total capacitance C_{ntot} and the maximum temperature difference $\Delta \mathbf{T}_{\underline{MAX}}$.

22. (Currently amended) The ~~method~~ computer readable medium of claim ~~1~~ 19, wherein the I_{RMS} value is determined by the expression: C_{load}*V_{dd}*frequency*Switching factor.

23. (Currently amended) The ~~method~~ computer readable medium of claim ~~1~~ 19, wherein the thermal conductances $\mathbf{G}_{thi}$ are inputs for a circuit simulator that determines temperature differences between conductors $\Delta \mathbf{T}_{ni}$ as outputs of the circuit simulator.